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PERIODICALS

Character and Personality

March 1943. Vol. 11, No. 3.—Two articles of some interest to students of personality are: *Handwriting Pressure: Its Measurement and Significance,* by G. R. Pascal, and *Level of Aspiration as a Method of Studying Personality,* by J. B. Rotter.—In the former the author obtains considerable correlations between objective measurements of pressure on the pen and such traits as energeticness, expressiveness and impulsiveness. Rotter shows that aspiration level, as measured by self-estimates of performance at a simple motor test, tends to be lower in groups liable to strong inferiority feelings, such as students with deformities and certain types of criminals, than in normally adjusted persons.

Kurt Goldstein discusses Lewin's conception of rigidity of mental structure, disagreeing with his views as to its rôle in mental deficiency.

P. E. V.

Human Fertility

October 1942. Vol. 7, No. 5.—*The relation between metabolism and motility of human spermatozoa.*—By John MacLeod, Ph.D.—In this stimulating paper Dr. MacLeod reviews recent work, much of it done by himself and his fellow-workers at the medical college of Cornell University, on the physiology of human sperms—more particularly their metabolic behaviour in relation to their motility. As he points out, " until evidence is produced to the contrary we must assume that the motile activity of these cells is closely linked with their ability to reach and fertilise the ovum " and " it is therefore pertinent to investigate the source of the energy necessary for motility and to determine the chemical mechanism in the cells which make this energy available." Before 1939 there had been very little quantitative investigation of the metabolism of human sperms and the results of much of what had been done were vitiated by the fact that the authors had ignored bacterial growth and its metabolic products in the semen during the period of the experiment—stating merely that it was negligible. In 1939 Dr. MacLeod initiated investigations into the metabolism of human sperms and the enzyme systems responsible for maintaining their motile activity, using the manometric method worked out by Otto Warbug in 1928, by which it is possible to measure with great accuracy the metabolic activity of minute amounts of living tissue. After careful consideration Dr. MacLeod decided that manometric measurements of sperm metabolism in either seminal fluid or blood serum might be misleading and that for various reasons the most satisfactory medium in which to suspend the sperm would be Ringer's solution. Preliminary trials showed that " the centrifugation necessary to get the sperm out of the seminal fluid and their transfer to Ringer's solution did not appreciably affect their motility or damage them in any other obvious way," and that their motility was well maintained in this medium at 38 deg. C., under certain gas phase conditions, up to periods of twelve hours.

The first series of experiments was designed to study the oxygen consumption of sperms and this, rather to the author's astonishment, was found to be negligible over a three-hour period although the sperms remained fully active throughout this time. These results were at variance with those obtained by Shettles, who measured the respiratory quotient of sperms in seminal fluid and reported figures for respiration seven times greater than those found by the author with sperms suspended in Ringer's. Dr. MacLeod therefore examined the oxygen consumption of seminal fluid devoid of sperms and found that this was appreciable and of a nature still unexplained.

He then proceeded to examine the mechanism of glycolysis—the other main metabolic pathway open to sperms—which he insists should be strictly defined " as in the splitting of a sugar into lactic acid." His preliminary experiments established the facts that sperms in the presence of glucose produce lactic acid in large amounts, and that while their motility is well maintained under anaerobic conditions it may be adversely affected if oxygen or air is present. He next designed experiments to determine whether glycolysis was the main source of energy for motility and upon what substrates spermatozoa might depend for their energy. It was found that when sperms were suspended in glucose-free Ringer's at 38 deg. C. they produced little lactic acid and that within three hours both glycolysis and motility had ceased. Under anaerobic conditions, if glucose was added at the end of the first, second and third hour, glycolysis and motility recommenced and proceeded almost at the same rate as in the control. If a similar series of experiments are carried out under aerobic conditions (95 per cent. oxygen), glycolysis and motility cannot be restored after the first hour—thus indicating that sperms cannot long be deprived of glucose when oxygen is present. Dr. MacLeod then used similar experiments to determine what foodstuffs, other than glucose, could be utilised by human sperms as the essential source of energy for motility. He tested a number of carbohydrates and found that fructose, mannose, maltose and glycogen were all able to restore glycolysis and motility; while galactose, sucrose and lactose failed. As the author says, " the ability of spermatozoa to use glycogen as a source of energy for motility is of considerable interest when viewed in the light of substrate availability in the female genital tract." Substrates other than carbohydrates were tried (e.g. various amino and

fatty acids) but none were found effective in maintaining the motile activity of human sperms.

In another series of experiments the author determined: (1) How long motility is maintained at a body temperature in the absence of sugar, and (2) at what stage recovery of motility can be induced by the addition of sugar (*a*) under anaerobic and (*b*) under aerobic conditions. The ability of spermatozoa to recover motility is considerably longer lived under anaerobic (up to six hours) than under aerobic conditions (between two and three hours). He also established the fact that substances such as cyanide and carbon monoxide, which inhibit cellular respiration, have no depressing effect on sperm motility, whereas glycolysis inhibitors such as iodoacetic acid and sodium fluoride gradually reduce motility to *nil* within about two hours; this still further supports the theory that glycolysis is the metabolic pathway by which human sperm derive energy for motility.

The author then discusses the rôle of oxygen in the metabolism and motility of sperm. From the evidence already quoted, which demonstrates an absence of respiration, and from the fact that spectroscopic examination of masses of sperms (treated with hyposulphite to bring any cytochrome present into the reduced state) has failed to show the presence of cytochrome, it might easily be assumed that sperms cannot respire. However, if succinic acid is supplied to sperms instead of glucose a vigorous and progressive oxygen consumption occurs. Furthermore, the addition of sodium malonate (a known succinic dehydrogenase inhibitor) inhibits succinate oxidation by spermatozoa—and, since succinate dehydrogenase has so far never been chemically isolated from the cytochrome complex, it appears that human sperms most contain this complex and be capable of oxidation in the presence of suitable substrates. The energy resulting from the oxidation of succinate is, however, incapable of supporting motility, and the activity of sperm in the presence of succinate fails rapidly if glucose is not also supplied. To account for the loss of motility which takes place in high oxygen tensions the author suggests that, in the presence of oxygen, sperms (like certain facultative anaerobic bacteria) convert such oxygen as they absorb into hydrogen peroxide through the agency of a "yellow enzyme," and that it is the hydrogen peroxide so produced that has a toxic and immobilising effect on the sperms. If this is so it means that sperms are lacking in catalase, or similar enzyme, to protect them against their own products of metabolism in the presence of oxygen. The author quotes various experiments in support of this theory but states that there is no conclusive evidence that hydrogen peroxide is formed during the course of sperm metabolism since it has not been isolated chemically. However, the small amounts necessary to depress motility are likely to be broken up and lost rapidly in the presence of so much cellular material.

Finally, the author discusses the relationship between metabolism, degree of motility and fertilising capacity of sperm, and gives as his conclusion that so far no correlation has been demonstrated between the degree of motility and the glycolytic rate. It seems that there is a minimal glycolysis below which motility will fail but above which sperms may form lactic acid very much more rapidly without showing any increase in motility. In other words, certain sperms are wasteful of their source of energy and it is still uncertain whether such sperms are more or less potentially fertile than those which are more economical. Incidentally Dr. MacLeod has come across samples of seminal fluid with a normal sperm count in which the sperms showed no sign of motility but, in spite of this, were found to be producing lactic acid at a high rate, and this glycolysis could not be distinguished from that of normal motile cells. "It seems probable that in such cases the link between the source of energy and the motility mechanism has been severed," but this abnormality needs further investigation before it can be understood.

MARGARET C. N. JACKSON.

Mental Health in Later Maturity

(Supplement No. 168 to the Public Health Reports).

Measurement of Social Maturity Applied to Older People.—By Edgar A. Doll.—That the increase in life expectancy during the last forty years should be accompanied by the preservation of social effectiveness in elderly people is of the utmost importance in the problem of an ageing population. Otherwise, with the burden of work and production falling upon the dwindling proportion of young and middle-aged, we are faced with the choice between national or individual survival.

Dr. Doll's study is made from two selected samples, one based on 12 feeble-minded males over the age of 50 who had been institutionalised for 30 years, the other on a scattered selection of 13 once physically and mentally normal male subjects between the ages of 65 and 80.

Previous studies by Dublin, Kaplan and Dayton have shown that only 7 per cent of idiots and 16 per cent of imbeciles survive beyond 50 years and that it is rare for the feeble-minded to live beyond 75 years. Using the Vineland Social Maturity Scale, Doll found that his 12 feeble-minded subjects showed no appreciable change after the age of 25, that there were also no appreciable changes in their Binet mental ages and that any decline after the age of 50 was in degree rather than level of social activity. Of the 13 once-normal subjects, the findings range from one who showed no loss at 70 from his social age score at 50 years to one whose score had dropped from 22 at 50 to 14.1 at 78 years. The majority of the lower scores were associated with physical handicaps and it is concluded that decline in social competence reflects waning vigour.

K. H.

Milbank Memorial Fund Quarterly

April 1943, Vol. 21, No. 2.—*Life Tables for Social Classes in England.*—Dr. Christopher Tietze gives an analysis of the class differences in mortality in England based on the Registrar-General's Decennial Supplement, 1931. Particular interest is attached to these findings in view of the fact that, as far as is known at present, the next census will not be taken until 1951. Expectation of life at birth is approximately 63 years for the professional group and for agricultural workers; 60 years for employers and clerical workers and for skilled workers; 57 years for the intermediate class between skilled and unskilled workers, and less than 56 years for unskilled workers and for coal miners.

This journal also contains articles on the nutritional status of aircraft workers in Southern California, recent changes in income and food expenditure, and a study of food habits of tuberculous families in Harlem, and the variation in nursing service with family income.

K. H.

CORRESPONDENCE

Family Allowances

To the Editor, Eugenics Review

SIR,—The only State system of children's allowances which the *Eugenics Society* should support is mine—fourteen or more shillings a week to married couples for each child of the first two confinements, with nothing for subsequent offspring. It would raise the marriage rate and birth rate of the richer two-thirds of the population and yet help the overburdened parents of the poorest third about as much as would the Beveridge scheme, and it would be preferred by a big majority of the adults under forty.

If anything like the Beveridge scheme becomes law, the *Eugenics Society* should urge abortion and sterilization being made available to any parent desiring one or both of these.

B. DUNLOP, M.B.

Binfield, Berks.

The Span of Life

To the Editor, Eugenics Review

SIR,—As bearing on the question of *The Span of Life*, which was discussed in Mr. Bramwell's interesting article in the April number of the EUGENICS REVIEW, the following may, perhaps, be worth noting:

MEAN AGE AT DEATH OF HYMN-WRITERS, THE AGES BEING TAKEN FROM *The English Hymnal*:

37	writers of the sixteenth and seventeenth centuries ...	61·7 years
49	writers of the eighteenth century	68·1 years
106	writers of the nineteenth century	68·6 years

C. F. ARDEN-CLOSE.

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Deterrents to Parenthood

To the Editor, Eugenics Review

SIR,—I feel obliged to comment on some of the remarks made by one of your correspondents in the January issue.

First, as to the suggestion that the fall in the birth rate of intelligent children is due to apathy on the part of intelligent women. This may in part be true, but one certainly cannot generalize. In my experience and that of women friends, the fault would appear to be rather on the part of the men than the women. Most men tend to regard women as of inferior intelligence, and it may be for this reason that they also tend to treat those intelligent women whom they do meet as if they had no sex instincts. I wonder how many of these intelligent but sexless women your correspondent has met. I have yet to meet one who does not hope to marry one day and have children.

One possible deterrent to the woman is the lack of available men. Naturally she wants to marry a man of equal intelligence if only to secure a happy relationship. Unfortunately, however, intelligent men seem to be elusive and many prefer to marry women of less intelligence than themselves. This obviously results in a preponderance of unmarried women among those of higher intelligence.

As to the intelligent woman being the cause of unhappy marriages, this is an extraordinary statement to make. Unhappiness occurs in all types of home, though perhaps there are more separations and divorces among the intelligent because they are better judges of their own limitations and have more opportunity, for economic reasons. I cannot give first-hand evidence of happy marriages between equally intelligent people, as none of my friends have yet been married long enough for me to judge, but the Curies are a classical example. I can imagine nothing more conducive to happiness

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